Gas Journal

VOL. 308 113th YEAR LONDON, OCTOBER 18, 1961 No. 5120 PRICE 1/9

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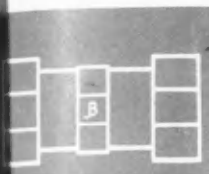

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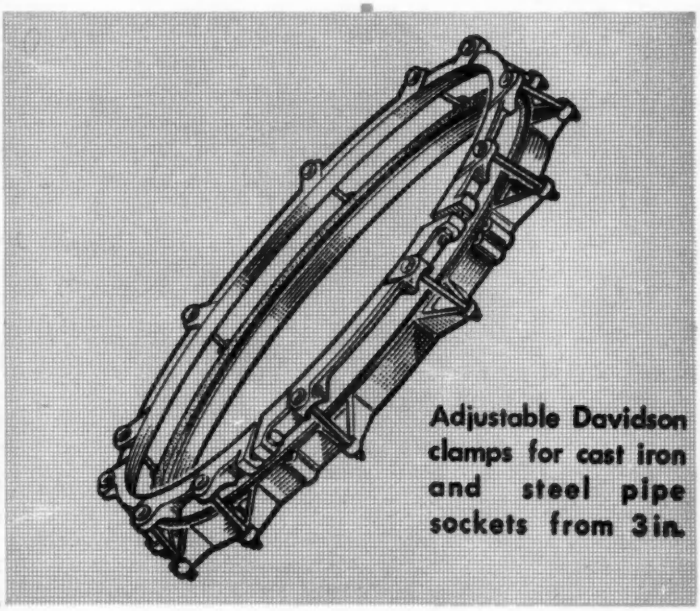

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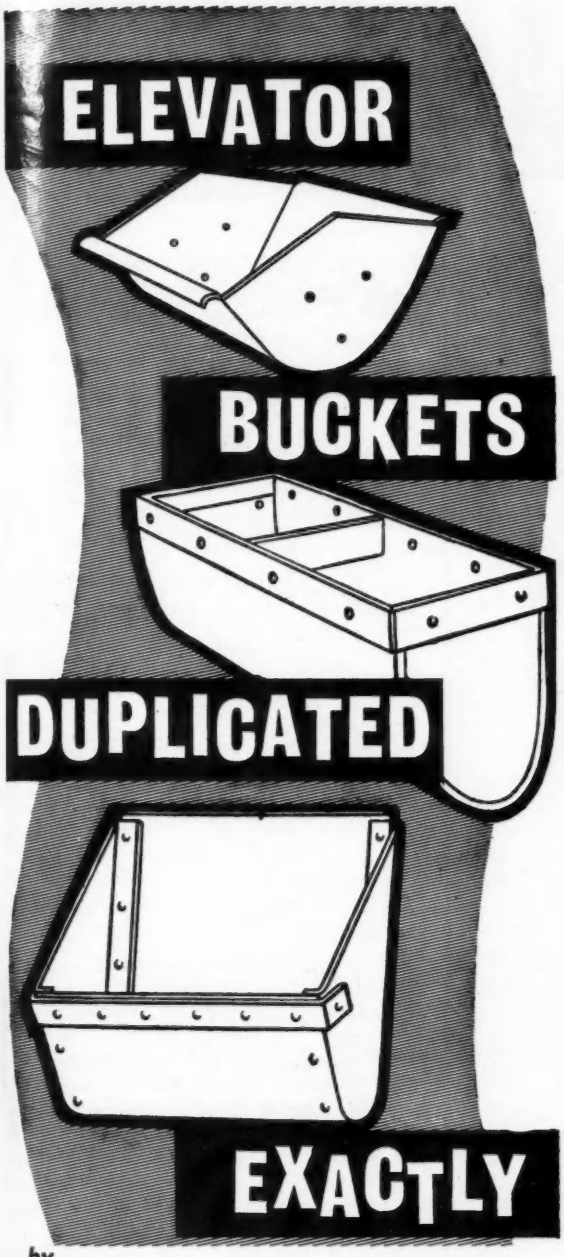

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Gas Journal

VOLUME 308 • NUMBER 5120 • 113th YEAR

WEDNESDAY, OCTOBER 18, 1961

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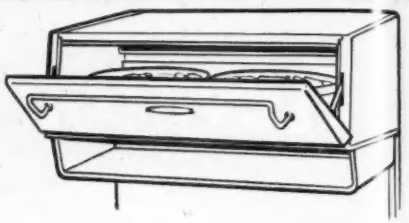

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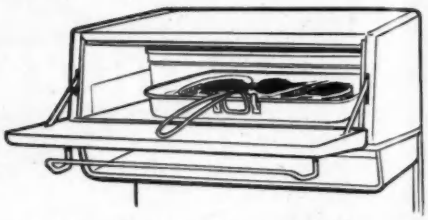

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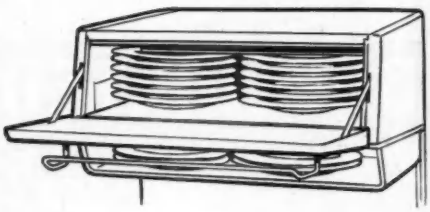

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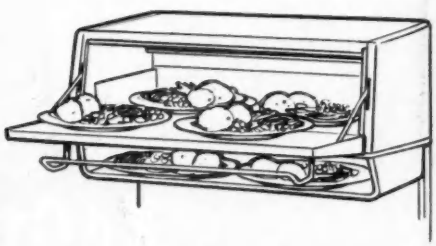

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Gas Journal

COKE OVENS • BY-PRODUCTS • CHEMICALS

Will British and U.S. practice converge?

DIFFERENCES as well as similarities between the British and other countries' gas industries are always of interest. They can also be particularly instructive. It is for this latter reason perhaps that the successive recipients of the grants from Woodall-Duckham Educational Fund administered by the Institution should have in turn visited the United States, and have been able to spend sufficient time there to undertake a short study course at the Institute of Gas Technology in Chicago, and a comprehensive tour of gas production installations and distribution systems.

This week we are publishing a paper by Mr. Alan Yates, an engineer at Technical Headquarters of the Wales Gas Board, in which he describes his experiences in America during his tour under these auspices last year.

Mr. Yates presented his paper to several of the Junior Gas Associations throughout the country, and we include the discussions on it before the Midland, and the Wales and Monmouthshire Junior Associations.

Our first reaction to papers of this type might be that having read one, we had read them all, but in fact this is by no means the case. Over the last three years as many pairs of recipients of grants from this fund have visited America, and we have been struck by the difference in the impressions each has had and the interesting accounts they have set down in their papers.

Clearly these young men have been picked with an eye to finding someone of the younger generation of gas engineers who, though thoroughly versed in the theory and practice of gas engineering and fully capable of its practical application, is sufficiently alive to his new surroundings to sense the differences and ask intelligent and pertinent questions.

From Mr. Yates' paper we are not certain what the subject was of his particular course at Chicago—or if in fact he took one at all, though this seems to have been done by other holders—but we find an interesting overall picture of the American gas industry without excessive detail, which makes us realise the kind of problems facing it.

The exhaustion of the natural gas resources, likely to come about in the 1980's, will have to be overcome somehow, and it is interesting to read of the gas-making processes now under investigation and referred to in the paper, to meet this contingency.

Presumably these or other means of producing the immense quantities of town gas, or 'pipe-line' gas as the Americans call it, will be fully developed in 20 years' time; though probably increasing use of natural gas from the truly vast resources in Canada will stave off actual failure of supplies for a number of years, since we understand that these supplies have now been released for export to the U.S.

The processes referred to by Mr. Yates are particularly interesting and one of them using the hydrogenation of a pre-processed char seemed the kind of method which might prove of use in Great Britain.

In the past the interest of the American industry for British gas engineers has been chiefly in its differences, differences in engineering practice which on the whole could not, without very considerable modification, be applied to the British industry. Now, however, a change seems likely, and the very great gulf between a country which uses natural gas and one which uses manufactured gas, may begin to close. On the one hand Britain may begin to import natural gas for reforming into town gas or as an enricher for large scale gas production by other means.

On the other hand America will have to find a means of manufacturing gas on an enormous scale and at a high calorific value. The feedstocks are likely to be oil-shale, oil products or coal. If the latter can be effectively gasified on such a scale at an economic price, it will clearly interest both countries, and the outlooks of the American and British industries will begin to converge once more. The importance of such a process seems paramount, and hydrogenation would appear to have certain advantages.

The availability of very large quantities of low-priced gas and its successful sale to the public, bring with it certain peak load problems and difficulties in plant load factor caused by low summer demands. Underground storage is clearly the answer to this. In America the storing of natural gas in worked-out oil and gas wells, or storing l.p.g. in caverns is one solution, but the aquifer method of storage would, it seems to us, be a better one.

Half-yearly surplus for the National Coal Board

THE recently published half-yearly results of the National Coal Board show how the coal industry fared during the first half of 1961.

Colliery profits from all coal fields amounted to £18.65 mill.; from opencast working came an estimated profit of £3.465 mill., and from ancillaries one of £1.28 mill. The total working profit for the industry for the half year amounted therefore to £23.395 mill. From this sum must be taken net interest payable of £57,000, leaving a disposal profit of £25.338 mill. Over the period under review a sum of £20.738 mill. was paid in interest to the Ministry of Power, leaving an overall estimated surplus of £2.6 mill.

In addition to particulars for the half year, corresponding details are given for each of the two quarters, and it is here that some of the difficulties facing the Board show themselves.

Whereas the disposable profits for the first quarter amounted to £19.405 mill., those for the second quarter only reached £3.939 mill., while the payments to the Ministry were £10.51 mill. and £10.228 mill. respectively. The overall surplus of £8.892 mill. in the first quarter had been replaced by a loss of £6.292 mill. in the second.

Excluding coal from opencast sites and from licensed mines, the coal available for sale commercially in the half year amounted to some 87.103 mill. tons, to which must be added coal consumed by the Board and miners' coal, giving a total of some 92 mill. tons.

Total costs of production of saleable coal amounted to the equivalent of 87s. 5·8d. per ton, which at an average selling price of 91s. 5·8d. allowed a profit of 4s. 0·7d. per ton on all coal sold. The average wage varied from £16 18s. 11d. per week at the face to £13 17s. 8d. on the surface.

The profit or loss incurred in the individual divisions of the Board are interesting and illustrate some of the possible difficulties encountered in mining under local conditions prevailing in each. For example, the East Midlands Division with the largest output made the highest profit at 12s. 8·9d. per ton, while the Northern Division with about a third of the output, the lowest profit at 3½d. per ton. The Scottish Division with an output somewhere in between the two accounted for the highest loss at 12s. 2·8d. per ton, while the North Western Division with an output about equal to the Northern Division made the smallest loss at 3s. 2·9d. per ton.

We understand that the East Midlands coalfield is the most extensive and has the highest output per man-shift.

The governing class

THE technology of gas governing appears to have been shrouded in an aura of mystery in the days of the original King's Treatise (1882), and there is a tendency for it to persist into some aspects of the subject even today.

So believes Mr. R. Hutchinson, of the Bryan Donkin Co., Ltd., who appears to nurse an ambition in life to remove the last remnants of that mystery by taking the lid off gas governing at I.G.E. meetings around the country. Armed with a formidable batch of slides and a blackboard, Mr. Hutchinson conducts his governing class with great authority and considerable finesse.

His last lecture on the subject was given at Cardiff last week when he addressed the Wales and Monmouthshire Section.

The theme throughout this address was a recurring question in two parts: (i) How should the various types of governors fail to safety to meet the very diverse applications? and (ii) which of the more common applications warrant standby governors and what form shall these take?

These two questions were viewed against the background of the adverse criticism that gassing fatalities attract in the newspapers—and the distribution engineer's assessment of how far it is prudent to go with safety features when there may be greater risks in practice with complicated safety features, than are inherent in the basic governor they are designed to protect.

In the paper a survey was made of current developments in governor technology, with an emphasis on the theme that safety features go hand in hand with many new applications. And the author pointed out that it is a matter for consideration as to how far it is prudent for the distribution engineer to go before the difficulties of maintenance limit the practicability of providing for every emergency.

Central heating on the Continent too

PERHAPS the clearest sign of rising standards of living is the desire to raise standards of comfort, and this cannot be better illustrated than by the growing demand for a well-warmed house, with the minimum of labour involved. Once considered a luxury and only possible for the well-to-do, central heating is now looked upon by many as almost a 'must'.

That this excellent move towards a better understanding of the proper use of all fuels, refined, smokeless or otherwise, is felt on the Continent as well as in Great Britain was brought home to us when we attended a reception given by Powell Duffryn Heating Ltd. recently to meet European heating engineers.

Mr. H. H. Hollesen, from Denmark, the largest manufacturer of radiators in Europe, and Mr. K. Lomdahl, his Chief of Research, made it quite clear that developments were afoot not only to popularise central heating, but so to design radiators that they would meet all demands made upon them, be cheap to manufacture and blend into the furnishings of any room in the house.

A particularly good example of this was an aluminium panel radiator, backed by a small-bore steel tube. The merits of this design are that it is light—it *could* be hung on the wall—it is unobtrusively decorative and it reacts quickly to changes in ambient temperature.

Denmark, however, is a colder country than Britain, and is completely devoid of fuel resources, so outside the big cities of Copenhagen, Aarhus and Odense, it is unlikely that the boilers would be gas-fired, but small-scale district heating schemes have been successfully employed in the smaller towns and villages, with oil as their fuel.

In France, however, endowed as it is with boundless resources of natural gas, the position is quite different, and M. Charles-Henri Lemoing, a French heating engineer, who was also present, has done much to extend the use of gas for central heating in houses of all types throughout France. Like the Danes, he made it quite clear that central heating must no longer be considered a luxury, but at the same time heating engineers must have available suitable boilers and radiators, and perhaps equally important, design layouts to give the greatest possible heating effect, efficiency and room comfort.

Meeting the need for clean water

THE new wing of the D.S.I.R. laboratory for water pollution research at Stevenage will increase its capacity by some 40%. The need for this extra accommodation has been brought about by the greater interest in pollution control and in an effort to meet the increased demands by industry, local authorities and river boards for research connected with it. This in turn has been the result of legislation amounting to three Acts of Parliament passed within the last three years dealing with clean rivers, the prevention of pollution in rivers and public health.

The ever increasing demand by industry and domestic consumers for more water from available supplies has made it necessary for surface water to be used more than once. This very fact has meant that more must be known about its purification, the mechanism of existing systems of sewage treatment and the discovery of new methods.

At the Stevenage laboratory a great variety of work is in process—a far cry from the modest start made in 1927, when the organisation had no laboratories of its own, and the temporary laboratory started at Watford at the outbreak of the second world war. It was not until 1954 that the present buildings at Stevenage were occupied.

The gas industry's principal interest in sewage treatment is probably the effect ammoniacal effluents are likely to have on the working of the outflow stations, and the maximum proportion of the total dry-weather flow through them that may be represented by those effluents.

Efforts to render them innocuous have met with varying success. Chemical treatment, though effective, has invariably proved too costly and has therefore had to be abandoned, but there appear to be distinct hopes that the biological processes now being developed may prove effective and cheap. Phenol and thiocyanate would appear to be the most important toxic constituents which must be destroyed before gasworks effluent can be allowed to enter sewage treatment works, streams or rivers in any quantity.

Microbiology is one of the many processes being studied at Stevenage, but the whole subject of water pollution and its prevention is so wide that it is not surprising that the laboratory's work includes the study of materials for percolating filters, the treatment of activated sludge, and the very arduous task of reducing the heavy pollution of some of our major rivers and estuaries.

Central heating costs

THE gas industry owes a great deal to the efforts of manufacturers in the field, and this is certainly true of Thomas Potterton Ltd., who really pioneered the gas boiler in this country and who, four or five years ago, did much to convince gas boards that the central heating load was not necessarily the monopoly of oil.

The publication in 1958 of tables and graphs of comparative costs of central heating with different fuels, while scrupulously fair, revealed gas in a more favourable light than some had anticipated. Now Pottertons have brought out an up-to-date version in the form of an attractive booklet, 'Central Heating—What it Costs for Your Home,' which was launched at a recent exhibition in their Regent Street showrooms.

The figures make interesting reading—indeed, essential reading for anyone connected with the commercial side of the industry—and the essential graphs and tables are reproduced in the October issue of *Gas Service*.

BRIEFLY . . .

Gas on the railroad

Gas is likely to help keep the American railways on the move in freezing weather, according to a *Financial Times* report. It seems that the flaring oil torches used to heat the points switches are likely to be replaced by gas-fired overhead infra-red heaters. They will be suspended over the tracks, the radiant heat being beamed at the switch-points below.

On their toes

An editor is instinctively terrified of the misprint, but he can usually relax enough to find amusement in the occasional typing error. A reporter's copy for a current news item reads 'A ballet of members returned Mr. F. C. Barker and Mr. O. G. A. Hoffman, with Mr. R. Mason, latterly assistant secretary and treasurer, as Mr. Wilkinson's successor.' One pictures with pleasure these graceful arabesques in a sort of ballet boufe, with the Yorkshire Juniors' Committee performing an exciting pas de huit.

Industrial showcase

An exhibition including the largest collection of gas-fired industrial installations ever housed under one roof in the north west opens today at the City Hall, Manchester. The North Western Gas Board's special section of this Industrial Equipment Exhibition is said to be larger than the recent Gas at Work in Industry Exhibition in London. Forty-one industrial firms from all over the United Kingdom have lent equipment and a separate section will present the work of the gas industry in the north west. We shall be reviewing the exhibition in the next issue of *Gas in Industry*.

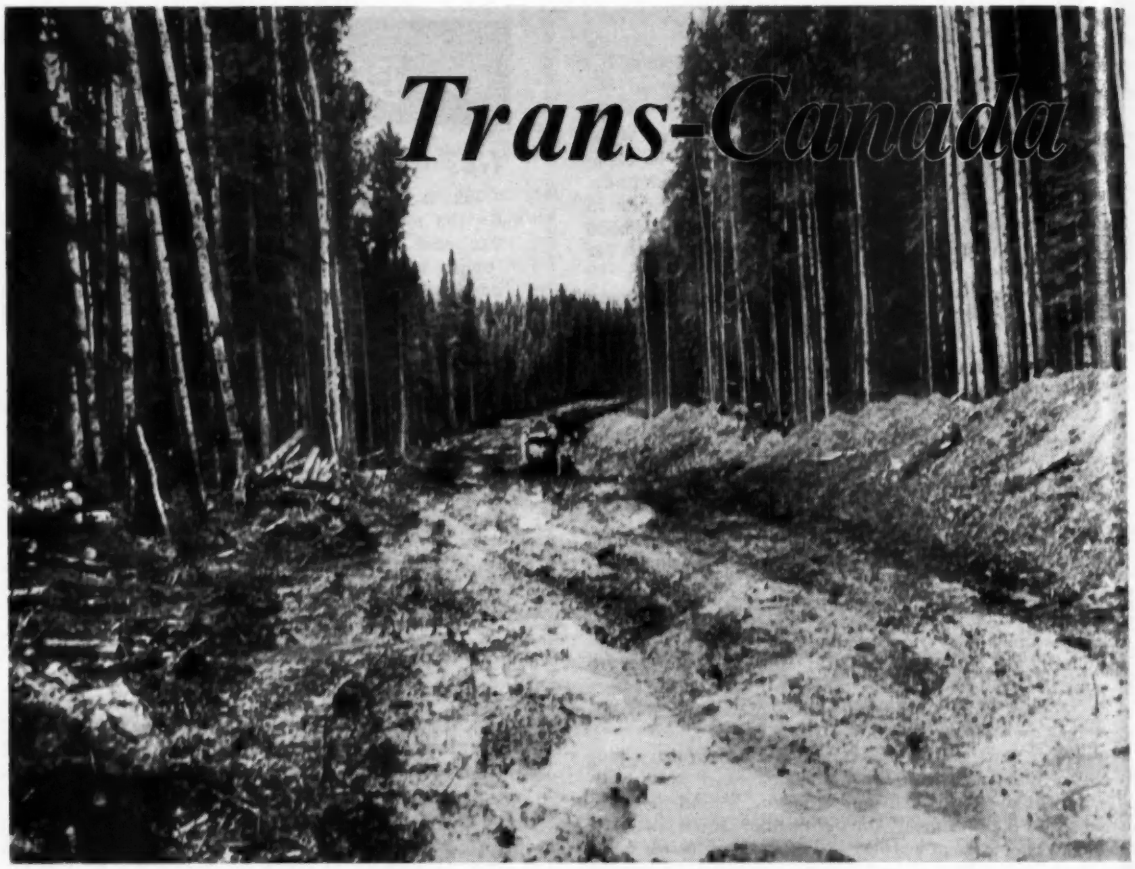
That methane decision

The *Financial Times*, commenting last week on the awaited Government decision regarding imported liquefied natural gas, remarked that the decision cannot be based only on the state of the gas industry's finances. 'The possibility of early entry into the Common Market makes it the more essential that the Government should find a better balance between the claims of the coal industry and the need to provide industry with cheap power. At present, while it lacks a settled policy, sensible long-term investment, either by industry generally or the fuel industries themselves, is almost impossible.'

Doggerel—man's best friend

If you want a message to attract that little extra bit of attention, try putting it into verse—it never fails. Mr. Gilbert Hammond, a gentleman who calls himself Yorkshire's Royal Poet, is certainly aware of the fact. Delighted with his GasMiser heater, he expressed his satisfaction in rhyme and sent the resulting hymn of praise to Mr. A. F. Oatley, Chairman of Cannons. Believing that one good poem deserves another, Mr. Oatley replied in verse. Neither effort seems likely to win any laurels, but it is such little outbreaks of humour and humanity in a business world which help to make the wheels go round. And if you want to see the poems themselves, have a look at the November *Gas Service*.

Trans-Canada



This is a sample of sticky, slimy muskeg through which the pipeline had to proceed. Hundreds of tons of crushed stone had to be sunk first to provide a solid bottom for the pipes.

Drilling the pipe ditch elsewhere along the route, progressing foot-by-foot through solid rock.

WITH the completion of the Trans-Canada pipeline for natural gas most Canadians simply dismissed the subject from their minds as a finished project, whereas, in reality, it was only the beginning of some of the toughest pipeline laying in the world.

The real hardships began when the line was extended from Toronto to Montreal. As the Ontario border was crossed and the pipelayers entered the wild province of Quebec, they really started their battle with nature in

By Hugh G. Jarman

the raw—sticky slimy muskeg, where section on top of section had to be laid as they sank overnight to depths which caused the pipes to snap.

As such sections were encountered hundreds of tons of crushed stone had to be spread on top of the muskeg and allowed to sink. More was added until it was possible to bring the solid bottom up to somewhere near the level of the balance of the pipeline.

From Montreal the mainline pushed on to Ottawa. The mainline branch out of Montreal was picked up by another subsidiary company, known as the Quebec Gas Transmission Lines Ltd. This company is laying over 1,000 additional mainline miles through the Quebec wilderness, along the south shore, to Quebec City, and then north.

This mainline will eventually cross over into New Brunswick, where one line will branch off into the United States to join the already established thousands of miles of United States distribution systems. The other will run

battles across Quebec to U.S.

Sub-zero welding was an everyday job in Quebec's rugged winter.

through Nova Scotia, with future plans calling for the line to extend across the open water to Newfoundland.

Pipeline laying advanced a foot at a time in some places along this mainline as suitable paths for the pipes had to be blasted through solid rock. Others had to be hewn through virgin forests, swamps and muskeg; lakes and rivers had to be crossed, the pipeline being laid on the bottoms, below the frost line.

This is the kind of pipeline laying the crews will encounter along the north shore, as they battle their way to reach the huge smelting plants being erected to handle the millions of tons of raw minerals now being mined in that part of the province and Labrador. The mains will also extend to the huge aluminium company plants.

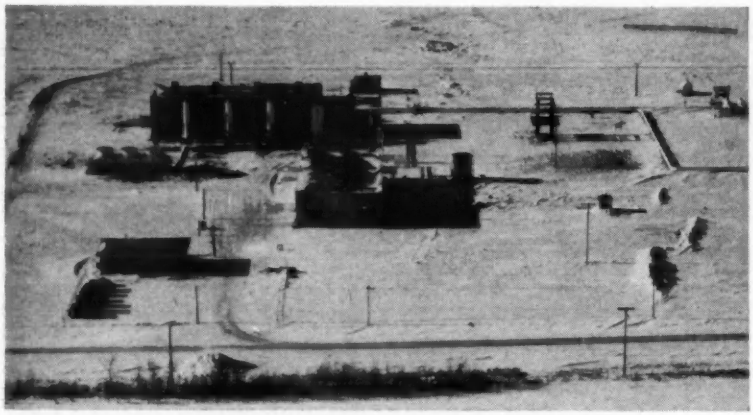
Pipeline engineers are expected to follow closely the routes established by the railways when they ran their lines into this vast wildnerness. It will be possible for natural gas mains to be better patrolled and serviced if such a course is taken.

Loading holes with explosives to blast rock for the pipe ditch.

The huge pipes can be hauled overland by the railways from their mainlines at Montreal to the various branches and unloaded at pipe depots along the right of way. From there comparatively short hauling by crawler-type vehicles can drag them to location over the swamplands and muskeg, which will be encountered along the routes.

One of the hardest stretches so far was what is known by the crews as '85 miles of damnation.' They say they would rather re-lay the entire Trans-

Pneumatic drills were used to prepare for blasting the solid rock.



One of the booster pumping stations necessary to force gas through the new mains.

Canada pipeline than have to do another stretch like that one. A labour force of 250 men, with the most modern of pipelaying and ditching machinery, was used on the stretch. It also included blasting, drilling and even cement-making machinery.

It was a job of dense forest removal, wide enough for machinery to move freely through. There was deep-cut blasting where it was not economical to run the pipeline over the high rock formations. There was seemingly bottomless muskeg, where hundreds of truck loads of broken rock, previously blasted, had to be dumped in to create a solid foundation for the main pipeline to settle on to at a safe bending depth. This eliminated an unnatural strain or stress on the line as the muskeg settled back into place after the line had been laid, welded and wrapped.

TELECOMMUNICATION LINE

The pipeline is strung along two steel bridges and six timber trestles, the longest being over 900 ft. in length, crossing the Bell River.

An unusual aspect of the project was the working alongside of electronic telecommunication installation crews, who were installing more than 375 miles of telegraph wire. This will be used for the dispatching of telephone circuits, and other services as well as teletype and other private wire services for the mining and smelting plants.

There are today 21 major pipelines including Trans-Canada, many of which have already been linked to United States mainlines. Much is being done to develop markets within Canada, and natural gas is now available to over 10 million Canadians.

However, the big hope for natural gas lies in industry. This is why the lines are branching off into the wildnerness, so that gas may be available for industries already established there. This ready-to-use clean, cheap fuel can compete with other Canadian forms of energy in large quantities.

Even though some economists believe other energy forms will eventually play a bigger rôle, natural gas is the prime energy source at the moment.

At present natural gas supplies only 14% of Canadian energy needs. The Royal Commission on Energy reported in 1958 that during the next 20 years this proportion will increase to 22%.

Woman architect's success

WITH her first competition entry a woman architect, who designed her own home at Wimbledon, has won a share in two of the four major awards for house designs.

She is Mrs. Lydia Dransfield who, with other architects throughout the country, was invited by the Gas Council to take a new look at modern living.

Mrs. Dransfield and Mr. Francis John Bancroft, both London County Council architects, worked together on the designs, which have won them a total of £1,000 of the £4,000 in prizes.

Their 'Autumn Double' included a design for a terraced house, thought by many private developers to be the house of the future. Their other entry was for a small detached or semi-detached house.

Mrs. Dransfield — married with two young daughters—and Mr. Bancroft are now working on the design for the L.C.C.'s £500,000 extension to the training college for teachers at Streatham.

A former member of their team in the schools section at County Hall, Mr. Denys Callaghan, of Blackheath, wins a £500 first prize for a large detached family home. And 24-year-old student architect Peter Cook takes the fourth top prize of £500 for his idea of how best to house the single person—'in a unit so simple in form it could be built economically on almost any scale.'

From a total of over 100 entries, four other students have won awards and another London architect has had a double success. Mr. Bernard Hartley, of Westover Road, Wandsworth, gets a second prize and shares a joint third in the competition.

The students are: Mr. A. Horan, of London, in association with Mr. M. F. Clements; Mr. A. J. Molyneux-Smith, an architect with the Huyton-with-Roby Urban District Council, Lancs., Mr. D. B. Stephenson, of St. Annes-on-Sea, Lancs., and Mr. H. Baxter of Sale, Cheshire, in association with Mr. Arnold Moss, who share combined second and third prizes with two other competitors.

Sir Henry Jones, Chairman of the Gas Council, will be presenting the prizes at a reception at the Royal Institute of British Architects on Tuesday, October 24, 1961.

The winning designs will be on display there until the Thursday and an exhibition of all entries will open at the Gas Council, 1, Grosvenor Place, S.W.1, on Monday, October 30, where it will continue for three weeks.

COMBINED TRAVELLING OXIDE HANDLING PLANT
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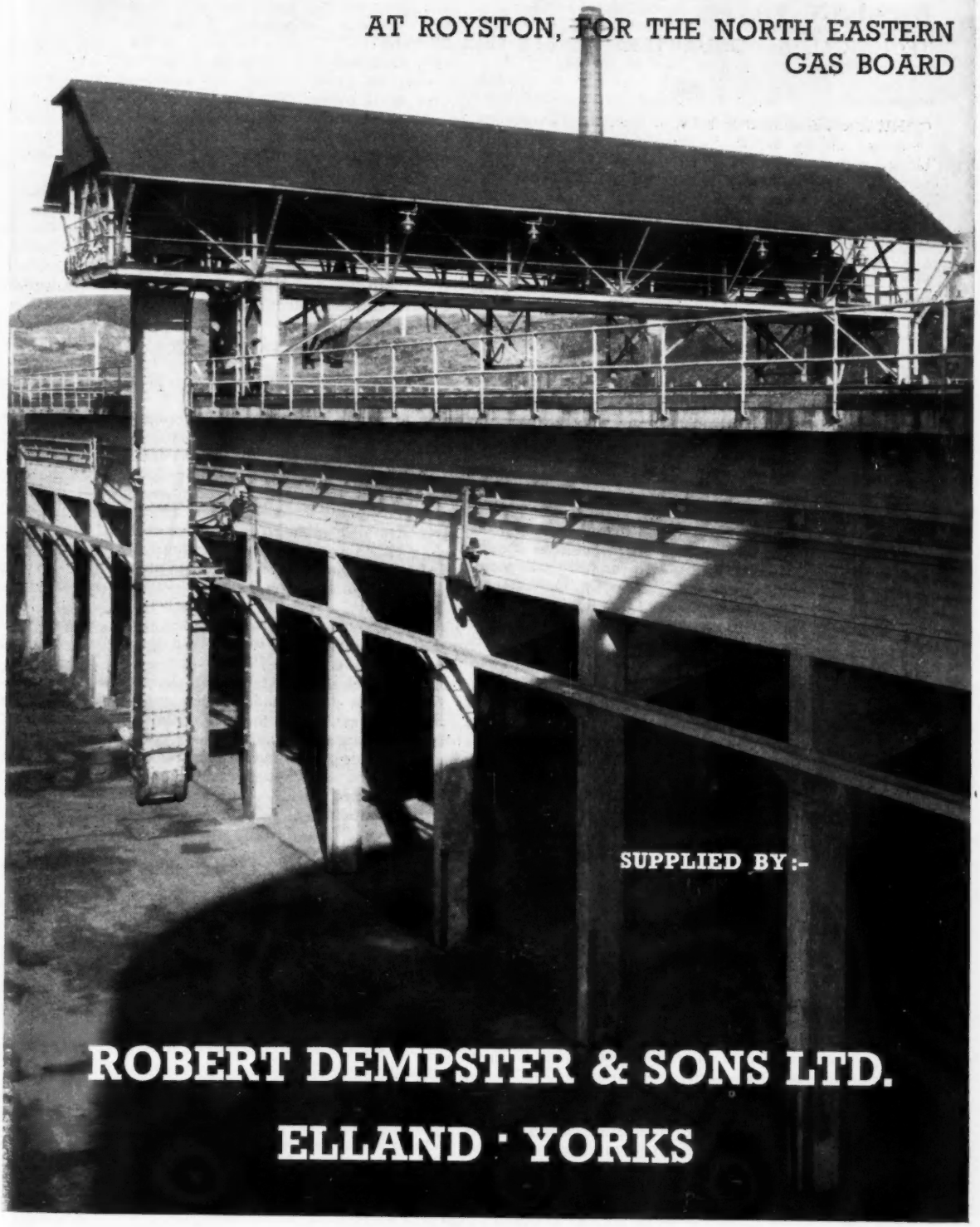

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From a paper to the Junior Gas Associations

The American gas industry 1960

By ALAN YATES,
TECHNICAL HEADQUARTERS, WALES GAS BOARD

THE essential difference between the American gas industry and its British counterpart is that America is blessed with vast reserves of natural gas at elevated pressure, while in Britain most of the gas is manufactured from coal or oil by processes which operate at or near to atmospheric pressure, and in which purification and other treatment play no small part.

To British gas engineers the prospect of an abundance of clean gas at high pressure appears eminently desirable, but, as in other things, abundance brings its own particular problems.

One detects in our own gas industry a quickening in tempo, and it seems likely that in the not too distant future there may well be many more similarities between the American and British gas industries than exist at present.

With a few important exceptions, town gas supplies in the United States comprise natural gas modified only so far as is necessary to stabilise calorific value, and natural gas is generally available in quantities adequate to meet normal average requirements. But gas transmission companies frequently require that their pipelines should operate at load factors within the range of 90%-102% of contract demand. Distribution companies, on the other hand, have frequently to face demands which are in the ratio of summer to winter of 1:6. The distribution company may therefore be called upon to meet daily demands in the region of 600 mill. cu.ft. per day of gas at 1,000 B.t.u. per cu.ft.; one begins to appreciate the very size of the peak load problem.

Gas—a major rôle

The reason for this is clear, since most American homes are equipped with central heating appliances in the operation of which gas plays a major rôle. On the other hand, summer time air conditioning loads have so far been largely taken up by electricity. In fact, the seasonal load factor of the electricity industry is the reverse of that experienced by the gas industry.

Methods of meeting the seasonal variations in gas demand, at the same time complying with the transmission companies' load factor requirements, fall into two main categories:

1. Increasing the summer time load.
2. Peak shaving in winter time.

Probably the most important single method for meeting both requirements is the development of underground gas storage at or near to the point of use. An example of this method is that of Northern Illinois Gas Company where the development of the Troy Grove aquifer storage enables 6,000 mill. cu.ft. of recoverable gas to be stored, and it is anticipated eventually to increase the capacity to 9,000 mill. cu.ft. of recoverable gas.

In addition, the Company holds over 4,000 mill. cu.ft. of gas in the Herscher Dome and Cooks Mills joint storage facilities. The maximum daily gas sendout of the Company to date is 630 mill. cu.ft. Further storage fields are being sought.

Although the electricity industry has a large share of the air conditioning summer time load, the gas industry is pressing hard in this field, with particular success in commercial and industrial installations.

Domestic air conditioning is a rather more difficult proposition, especially in existing properties where the compact, electrically-operated, window-mounted unit has proved very popular.

Summer time sales of gas to large industrialists and electricity generating stations also help considerably in meeting the requirements of the transmission companies.

Cold weather peak shaving

Peak shaving during extreme cold weather conditions may be effected by:

1. The use of interruptible supplies to industrial consumers, whereby interruption is applied only during periods of maximum demand and on a weekly basis.
2. The use of interruptible supplies to domestic space heating consumers whereby interruption is applied on the basis of ambient temperature, changeover from town gas to propane or fuel oil being effected either manually or automatically.
3. Peak load gas production in the form of l.p.g./air, of high B.t.u. oil gas or enriched carburetted water gas.

The use of 'interruptible at any time' supplies to industrialists also helps to level out the day to day variations in gas demand.

The development of natural gas supplies in America has without doubt made tremendous changes in the gas industry there, and at the present time, there are no shortages, but carefully prepared estimates indicate that the peak in their production will be reached between 1980 and 2000[1]. The same estimates also indicate that town gas demand may outstrip natural gas production between 1970 and 1980.

'Pipeline gas' processes

The development therefore of processes capable of producing 'pipeline gas', *i.e.* manufactured gas which is interchangeable with natural gas, is occupying the American gas industry, as well as other industries.

Of America's total fossil fuel reserves 48% is in the form of coal and 44% is in the form of oil shale, and processes for the production of pipeline gas from these fuels are receiving very careful consideration.

One such process undergoing investigation[2] operates at approximately 300 p.s.i.g., and produces synthesis gas from coal or char, the gas being shifted to give a 3:1 hydrogen to carbon monoxide ratio. After waste heat recovery and purification this gas flows to a methanator in which it passes over a Raney nickel catalyst to give a gas at about 800° F, containing 86% methane with a calorific value of 940

B.t.u. per cu.ft. After cooling it is compressed to 1,000 p.s.i.g. for pipeline transmission.

Another process[3] comprises the hydrogasification—hydrogenation—of coal char or oil shale at a pressure above of 1,000 p.s.i.g. and at a temperature of 1,400°F in a fluidised bed. A proportion of the char is hydrogasified, while the residual char is used for production of the process hydrogen by steam/oxygen gasification followed by shift conversion.

The possibilities of using nuclear heat in the gasification of coal slurry[4] is attracting considerable attention. The slurry in the ratio of water:coal of 1.5:1 by weight, is preheated to 600°F when the water is flashed into steam prior to admission into the gasifier, where the mixture is superheated to 1,700°-1,800°F and gasified at 30 atmospheres to give raw synthesis gas.

Heat for the endothermic reaction is provided by helium which circulates continuously first through a nuclear reactor to pick up heat, then through the gasifier which is in the form of a heat exchanger and finally through the slurry flashing and preheating heat exchanger, before recompression prior to re-entering the nuclear reactor.

In the natural gas producing fields themselves there is usually little more to be seen than a series of 'Christmas trees' (the assembly of valves and connections at each individual well-head), and connecting pipework to the gas collecting system.

Natural gas usually contains water, in vapour form and in liquid suspension, together with l.p.g. and gasoline. These are removed at high pressure, usually by refrigeration processes, using propane as the refrigerant, before being transmitted to points of consumption or returned into underground storage.

Compressed for re-injection

Compressors at the gas collecting system, at re-compression station on the transmission main and at underground storage fields near to the point of use, are almost always gas-engine operated.

The driving cylinders form an integrated unit with the angled gas-compression cylinders. The compressor station is frequently arranged so that it can operate for extended periods quite independently of external utilities other than the natural gas it is handling.

To achieve this object heat exchangers are in the form of fin-fan coolers using air as the cooling medium, the fans being driven by hydraulic power from the engine crankshafts.

Jacket water is contained in a closed circuit supplied from an elevated header tank. Distilled water, containing corrosion inhibitors and at a controlled pH value, is frequently used for this purpose.

Very elaborate precautions are taken to ensure that the entry of dust, dirt and other abrasive material into the engine is reduced to a minimum and to this end the engines are opened for inspection and overhaul as infrequently as possible.

Oil required for cylinder lubrication is taken from the crankcase and filtered before entering the forced-feed lubricators; the crankcase oil is maintained at a constant level by float control of fresh oil from an external container and the lubrication system is subjected to full-flow filtering.

In one transmission company in Oklahoma which is operating this system, the periods between bulk changing of crankcase oil are as great as ten years. Engine overhaul periods have been extended from 12 months to two years and engine condition has improved.

A saving of 7% in lubricating oil consumption has been experienced as a result of the above.

Measurement of the large quantities of gas handled at elevated pressures is invariably carried out by means of orifice flowmeters and considerable care is taken in maintaining accuracy of the instruments.

Normal procedure in one company visited is to examine orifice plates at six-monthly intervals, replacement being made when light reflection is seen on the 'sharp edge' or when irregularity can be detected by touch.

Routine examination of orifice places, without interference with pipeline flow, is achieved by the use of an orifice fitting incorporating a damper plate.

A transmission pipeline, with its recompression stations located at intervals along it, is generally owned and operated by a transmission company whose object is to pass as great a volume of gas as possible through the line during its working life.

Flow characteristics

The line is operated at the economic limit of its capacity for most of the time. Under such circumstances the maintenance[5] of good flow characteristics within the line is of major importance.

Although by no means a new development, the practice of internal coating is not yet wholly accepted by the American gas industry. Perhaps the greatest restraining factor is its cost of application.

At one transmission company trials are in progress to determine the long-term value of internal coating, but the cost of the coating process, using .0015 in. thickness of epoxy resin applied to individual lengths of pipe before installation and including pre-treatment, amounts to approximately one cent per in. diameter for each foot length.

This is equal to 1s. 8½d. per yard of 8-in. pipe. The flow efficiency of a pipeline which has been internally coated with epoxy resin is stated to be 107.8 compared with the figure of 100 relating to clean untreated pipe.

During welding operations a band, approximately 2 in. wide, at each butt-welded joint, is inevitably stripped of internal coating, but the effect on gas flow of this very short 'rough' section is quite insignificant.

Some work, however, has been done on *in situ* internal coating of a pipeline, and although some success has been achieved, undoubtedly the process will reach a stage of development when success may be assured. There still remain the problems of satisfactory *in situ* preparation of the pipeline prior to application of the coating and of obtaining an even thickness.

Technique gains popularity

The technique is carried out in Britain and is gaining in popularity particularly where pipeline construction may be halted, without undue sacrifice of economy, to enable full attention to be given to the preparatory treatment.

Automation in pipeline transmission is rapidly gaining ground, and complete automation of pipelines is well within sight. In fact, some transmission companies now have parts of their systems fully automated and are gaining operating experience. Other companies are making provision for eventual automation in new units of plant as they are installed.

One new compressor station visited in West Virginia has the dual function of compressing natural gas, gathered from adjacent underground storage fields into a transmission pipeline, and also of compressing gas, gathered from producing wells into the storage fields.

The installation which is entirely self-supporting comprises four 10-cylinder, 1,350 b.h.p., 2-cycle gas engines

with angled integral compressors. Gas is received at 300-600 p.s.i.g. and delivered at 500-900 p.s.i.g.

Auxiliary equipment comprises a fin-fan water cooler for each engine with oil motor driven air fans, gas engine driven generating and air compressing plant and fin-fan gas intercoolers and aftercoolers with electrically driven air fans.

The engines and compressors, including all valves, are automatically operated in sequence from a single push button station which includes instrumentation. With the addition only of the necessary relays, the whole installation could be fully automated.

To a very large extent, depleted oil reservoirs are used for underground storage of gas, and in such cases little more is required than the reconditioning or re-drilling of bore holes together with installation of the necessary compressing and field distribution system.

The problem of winter peak demands, as previously described, requires that the storage of gas should be close to the main centres of consumption whereas, in most cases depleted oil reservoirs are at a distance from the larger cities.

Aquifer storage is helping tremendously in some densely populated parts of the United States.

The aquifer at Crescent City is expected to cover an area of approximately 24 sq. miles at a depth of 1,200 ft. below sea level. With the gas 'bubble' at a maximum thickness of 80 ft., a total storage of 100,000 mill. cu.ft. is anticipated.

Injection and withdrawal holes commence in 13½-in. casing, to a depth of 300-400 ft., and are cement sealed on the outside. This first section is followed by 1,300 ft. of 5⅛-in. standard oil-well casing which penetrates to a depth of 140 ft. below the cap-rock.

Cement sealed

The outside of the smaller casing and the annular space is cement sealed. After completion of boring and sealing, 15 ft. of the casing and cement grout beneath the bottom of the cap-rock are perforated by exploding steel slugs outwards from inside the casing.

The length of casing beneath the perforated section serves to collect any sand which may pass through the perforations.

Injection pressure is limited to 100 p.s.i.g. above the hydrostatic pressure to obviate damage to the cap-rock which might be accompanied by leakage into the upper strata. There has so far been no evidence of loss of gas.

The increase in capacity of underground storage has done much towards reducing the need for peak-shaving plant.

Some cities, notably those on the Eastern Seaboard where underground strata are not suitable for development of aquifer storage, have facilities for manufacturing peak load gas.

This is generally carried out by reforming oil, either thermally or catalytically, but also l.p.g./air plants are used to a large extent.

Storage vessels, limited to 30,000 U.S. gal. capacity, are frequently installed underground. The outside surface of the vessel is treated with coal tar enamel and fibreglass wrap, and the whole installation is cathodically protected. Liquid is conveyed to the vaporisers by displacement using high pressure natural gas.

Internal examination of the vessels is not considered necessary. but safety valves are examined and tested every 12 months. N.F.P.A. No. 58 and No. 59—Standard for the Storage and Handling of Liquefied Petroleum Gases-1959 and Standard for the Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants-1958 respectively—are strictly adhered to in the design and operation of l.p.g. plants.

Admission of air to the gas for dilution is carried out by using the pressure energy of natural gas through venturi inspirators.

One of the major problems associated with air inspiration and gas mixing at the pressures experienced is that of an uncomfortably high noise level, so in one largely residential district, the venturi tubes, regulators and immediately connecting pipework are all underground in concrete vaults, and only the natural gas measuring strings and the air inlet filter/silencer are overground.

At another station owned by the same Company in an industrial district, the venturi inspirators and connecting pipework are overground, and despite the use of thick wrapping of sound insulating material on the equipment, the noise level is quite impressive.

Chequerboard street layout

One particular advantage which the average American distribution system has over its British equivalent stems from the chequerboard pattern of street layout which is common to most American towns and cities.

The accurate geometrical layout of mains lends itself admirably to the solution of distribution network flow problems using electronic computers.

The technique has tremendous popularity in America and the computer section of the Institute of Gas Technology, Chicago, is occupied for a very large part of its time in performing this function for various gas companies.

Mainlaying is very frequently carried out by contract with the gas company providing its own staff engineers for (a) planning the route and grading of the pipeline, (b) inspection of welds, by visual and x-ray methods, (c) inspection of coating and wrapping, cathodic protection, and (d) testing.

The problem of leakage of gas from socket and spigot joints in cast iron mains has received careful attention[6]. It is suggested that gas-tightness of socket and spigot joints depends mainly upon the jute packing rather than the lead or cement filler.

Two main palliatives

Progressive shrinkage of the jute as it loses moisture to the dry natural gas causes increased leakage. Two main palliatives are adopted with varying degrees of success. One consists of fogging low-viscosity oil at elevated temperature into the gas stream which, itself, may be preheated, the other is essentially re-humidification of the gas.

There is reason to believe that oil fogging is efficacious only if carried out before the jute has had the opportunity of becoming dry, i.e. prior to changeover from wet to dry gas, the oil then acting as a sealant. Re-humidification would appear to demand a moisture level in the gas at least equal to the original conditions.

More positive steps, aimed at reducing the loss of gas from socket and spigot joints, are:

1. External clamping of joints. This is frequently carried out as routine procedure when ever a joint or joints are exposed and regardless of whether the joint is leaking or not.
2. Internal sealing of the joints, such as the 'fuelling' method, which uses mechanical equipment inside the pipe to clean the area around the joint, followed by machine application of a 6-in. wide by ⅛-in. thick band of a thiokol rubber sealant.

Although external clamping is normally completely effective, it is costly and necessitates frequent street openings. One company has succeded in installing leak clamps through a 1-ft. square street opening.

The 'fuelling' method also requires street openings and the main being put out of use during sealing operations.

Concomitant with the use of steel mains and services is the necessity of guarding against corrosion and consequent leakage. Most gas companies have their own corrosion engineers.

The Peoples Gas Light and Coke Company in Chicago issues to mains and services personnel an instruction book which sets out the essential steps to be taken to minimise the risks of creating conditions where active corrosion might take place. It protects individually all services of 2-in. diameter and greater, using 3-lb. sacrificial anodes, and also insists on service trenches being backfilled with sand to reduce the risk of the formation of local cells at the junctions of different materials.

Mr. Yates presented his paper to several of the Junior Gas Associations, and we are publishing the discussions contributed to the meetings of the Midland Juniors at Birmingham and the Wales and Monmouthshire Juniors at Llandrindod Wells.

DISCUSSION

Mr. W. E. Dobson, Birmingham, opening the discussion for the Midland Juniors, referred to the use of plastic pipes for service laying, and noted that Mr. Yates had confirmed his own impressions when he too had visited the U.S.A. It had been estimated that between 1970 and 1980 the gas companies would have to undertake the manufacture of gas, and bearing in mind that the plastic pipes being used were affected by hydrocarbons, he asked what action was likely to be taken.

He also referred to the propane storage plant in Texas and asked if this method of storage could be undertaken in built-up areas.

Mr. Yates replied that the U.S. gas industry appreciated the problems connected with the use of plastic piping in handling manufactured gas, and he agreed that in the present knowledge of plastics technology, such piping would be vulnerable to attack from hydrocarbons in the gas. Nevertheless, the gas companies realised the advantages to be gained from its use and were still laying plastic pipes.

Propane storage tanks were nearly always buried in densely populated areas, but he had found it difficult to decide whether this procedure was, in fact, good engineering practice, or whether it was merely following what amounted to a fashion, started by one company and followed by others. The companies were generally in a healthy financial position, so they did not have to look too closely into the economics of the matter.

The cost of gas from the transmission companies was about 3d. per therm and the selling price about 9d. per therm—it was received under pressure and all the gas companies had to do was to distribute it.

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[5] R. T. Ellington and W. R. Staats, 'Development of a manual on computing flow of natural gas in transmission lines,' A.G.A. 1960.

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Mr. F. S. Charnley, Birmingham, wanted further information about the reduction of the c.v. of natural gas by air inspiration, and asked what the pressure of the incoming gas was and what proportion of air it contained.

Mr. Yates replied that the Chicago gas was received at over 1,050 B.t.u. per cu.ft. and only sufficient air was admitted to reduce the c.v. to 1,000 B.t.u. per cu.ft. The venturi inspirators were similar to those used in this country, *e.g.* at Cardiff. The c.v. control valve was on the air inlet to the venturis using a calorimixer. The volume of air inspirated was in fact very small.

The President, Mr. R. W. Nelson, Birmingham, asked whether the inspirator was mainly used for c.v. control or whether it was used for boosting gas.

Mr. Yates said that this equipment was not used to raise pressure in the installations which he had visited in America, although it was used by the Wales Gas Board for boosting low pressure gas supplies.

Mr. A. C. Jennings, Birmingham, asked what commercial policy the U.S. gas companies pursued. Gas seemed to be offered at such low prices that it would need no selling.

Mr. Yates said that the U.S. gas companies did try to sell their gas and offer particularly favourable terms for interruptible loads.

Efforts are made to increase commercial gas sales, and sales and service organisations there were very good. An American gas company did not have many showrooms, but engaged agents who operated in conjunction with the company, using the company's promotional facilities and general sales policy.

Mr. A. V. Wainwright, Senior Vice-President, Shrewsbury, referred to the use of interruptible supplies to domestic consumers where interruption was based on ambient temperature—the changeover from town gas to propane or fuel oil being effected either manually or automatically, and he asked whether the gas company installed the necessary apparatus or whether it was fitted by the consumer himself?

Mr. Yates said that he has seen this type of installation in Southern Illinois where the central heating appliances were purchased from agents. The consumer was responsible for fitting them, but they were inspected by the gas company before a gas supply was completed.

Mr. S. K. Hawthorn, Birmingham, was very interested in the picture of the American gas industry as outlined by Mr. Yates, although practices he had described might not be applicable to this country at the present time, they might well become so in the near future. 'In this country,' continued Mr. Hawthorn, 'we are not now interested in natural gas from our own sources, but with the advent of liquid methane, we might soon be looking into the possibility of using it.'

He said that the U.S.A. used to manufacture gas, but natural gas had made this unnecessary. Now we had learned that this in its turn was limited in supply and the gas companies would have to consider manufacturing gas again between 1970 and 1980, and so the interests of the two countries would tend to converge again; it was clearly up to us to take an interest in U.S. techniques.

Pipelines in the U.S.A. had now reached their economic limit and he wondered what would happen in the future. Some of the companies used liquid propane and air mixtures and reduced the c.v. by adding air and he asked whether this would affect distribution systems, and whether consumers had their own governors.

Mr. Yates said that as far as he could see, the U.S. gas companies did provide for increased peak gas loads by increasing their underground storage at the point of use.

He added that in the rural areas, consumers had their own high pressure governors, but this was not normally so in the larger towns.

There was not likely to be any adverse effect from the use of propane/air on pipelines handling natural gas since the latter was very dry, with a dew point of about −40°F.

Mr. D. J. O. Bath, Southampton, quoted Mr. Yates as saying that 'The change from manufactured gas to natural gas had been accompanied by increased "unaccounted-for-gas"' and asked why this was so, and whether it was due to natural gas being a dry gas.

He had found Mr. Yates' notes on the storage of gas very interesting, particularly since the Gas Council was looking into this matter. If their investigations proved successful, a considerable quantity of gas could be stored in this way in this country. The gas would require little or no treatment and such storage would mean an estimated reduction of 25% in plant operation. The overall saving in the manufacture and distribution of such gas would be very low.

Mr. Yates replied that the increase in 'unaccounted-for-gas' was in fact due to natural gas being dry, and in this connection a good deal of research was being done in the U.S.A. Sections of mains and joints were being cut out and closely examined. Shrinkage of the jute packing in the joints, through drying out, appeared to cause increased 'unaccounted-for-gas.'

The President asked whether new pipelines to be laid in the U.S.A., would be cast iron or steel pipes.

Mr. Yates said that the present trend was to use nodular iron mains. The U.S. gas industry faced the same problems in corrosion of steel mains as we did in this country.

Mr. S. Brockbank, Newcastle-under-Lyme, asked whether, since natural gas had no smell, leaks would go undetected.

Mr. Yates said that the gas was odorised and the odour level was maintained by frequent tests coupled with consumer reaction to excessive smell.

Mr. L. H. Hardy, Birmingham, referring to the storage of liquefied petroleum gas in caverns, asked whether if water was known to seep into the caverns, did this not mean that gas could seep out.

Mr. Yates said that in only one of the liquefied petroleum gas storage caverns in the U.S.A. had, as far as he knew, any ingress of water been noted. Pumps were generally installed to remove water from the storage cavern.

The cavern was located at least 300 ft. below the water table so that hydrostatic pressure always exceeded the vapour pressure of the liquefied petroleum gas being stored. Under such circumstances leakage of gas from the cavern could easily take place.

At the Wales and Monmouthshire meeting, **Mr. W. E. Whitney,** Newport, asked what was the average annual consumption of the typical American family using gas.

Mr. Yates replied that a figure of about 500 therms per annum was usual for cooking, limited room heating, water heating, and such-like purposes, but a very large proportion of consumers also used gas for central heating in which case the consumption rose to 1,400-1,800 therms per annum.

The President, Mr. C. W. Butler asked about the loss of B.t.u. when gas is transmitted at high pressure, and whether this loss is progressive after each compression.

Mr. Yates commented that in this country this was possibly due to the newness of a main or to the deposition of the hydrocarbons. In America extremely high pressures and low temperatures were used, and after the initial loss there was no further drop.

Mr. Parry wanted to know what were the distances and the pressure drop between compressing stations on the long distance pipelines.

Mr. Yates replied that the stations were 100-150 miles apart, and that a 300-p.s.i. pressure drop was usual. The pipe sizes were normally 18 in., 20 in. and 24 in. and no trouble had been experienced with condensation in these mains.

Mr. Breeze referred to the leakage test surveys carried out here to minimise gas loss, and asked what methods were used in America.

Mr. Yates replied that surveys were made by barring, and that samples of main joints were cut out and examined by the Institute of Technology in Chicago.

Mr. Briggs asked for more information on the method of clearing mains by the use of large rubber balls and wanted to know what types of house heaters were used for central heating.

Mr. Yates stated that the rubber balls were inflated by compressed air and pushed along the main under hydraulic pressure. There were no individual heating appliances and both hot water and ducted air furnaces were located in the basements of the buildings.

Mr. B. E. Wilson asked about the use of plastic pipe in general.

Mr. Yates replied that it was used for conveying natural gas but the industry was worried about the possible change-over to manufactured gas sometime in the future.

BOOK REVIEW

ABSORPTION, DISTILLATION AND COOLING TOWERS

By W. S. Norman

IN an industry as old as the chemical industry practical application of a principle has often anticipated the theory behind it. This is certainly true of absorption and distillation towers.

Following the work of W. C. Whitman and W. K. Lewis in the 1920's, there has been a systematic investigation of mass transfer operations which has enabled problems of this nature to be solved by the use of theoretical considerations in place of the trial and error methods used formerly.

The object of the present volume is to review the theory of gas-liquid operations and the practical information available on the design and operation of industrial equipment.

The first five chapters develop the theory of mass and heat transfer between gases and liquids, while the special problems encountered in absorption with chemical reaction and simultaneous heat and mass transfer are discussed in Chapters 8 and 9.

The performances of packed, bubble-plate and spray towers are discussed in detail over a further six chapters, while in a final chapter is indicated the procedures to be followed in tower design and operation.

Although this textbook is primarily intended for practicing chemical engineers and advanced students, the undergraduate should find much that will be of use to him in his studies. In the early part of the book theory is represented in greater detail than is customary in general textbooks of chemical engineering, and particular emphasis has been given to the correct use of equations, symbols and units. With this in mind, 32 worked examples have been included to illustrate their application to practical problems.

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NEWS SUPPLEMENT

Tay project up to schedule

WORK on the construction of the £100,000 pipeline to take Lurgi gas across the River Tay railway bridge is well up to schedule. Already the pipes have been positioned and coupled up between Wormit and Esplanade Station, Dundee. Engineers of the Scottish Gas Board are at present making tests of the pipeline on the bridge, which, at the end of the year, should be carrying Lurgi gas from Westfield to the Dundee gasworks for redistribution to Montrose.

EVIDENCE ON WINCHESTER PROJECT

Underground 'bubble' may house vast gas reserve

AN important underground gas store, capable of holding 10,000 mill. cu.ft. of gas, may be established in a stratum of greensand 800 ft. below Chilcomb, near Winchester, in 1964 or 1965, reports *The Times*. The Gas Council is looking for suitable geological formations in the Cotswolds, the west Midlands, and north-east Yorkshire which could be used for the same purpose.

New information about the Winchester project is given in the report of the Select Committee on Nationalised Industries, which contains the evidence given to the committee when it was inquiring into the economics of the gas industry.

Mr. C. H. Leach, then Chairman of the Southern Gas Board, explained that the stratum of greensand (50 ft. to 75 ft. thick) is both porous and permeable and at present contains water. Above it is a highly compressed layer of gault or clay.

'If you drill down through the gault, which is completely gas-tight, you arrive in this lower greensand,' he told the committee.

'You can push gas in at 700 lb. or 800 lb. pressure and this displaces the water. The gas, being lighter than the water in the surrounding rock, forms a sort of bubble in the greensand by displacing the water, thanks to the permeability of the sandstone.

'So you drill holes in, push the gas down into this stratum, and then when you want it you just turn the tap the other way and it comes out, because the water comes back and pushes the gas out.

'It is of great advantage in the respect that peak-load gas is always difficult to make, and the more we press on with selling gas for central heating, and so on, the more we may build up this peak load situation,' he said.

Sir Henry Jones, Chairman of the Gas Council, said that three sites in the Midlands and one in north-east Yorkshire offered 'quite good prospects' for natural storage.

A study made at Cliffe, in Kent, had been unsuccessful. He visualised six underground stores, with a total capacity of 60,000 mill. cu.ft. being needed.

If they were found it would improve the prospects for a national gas grid, but the store at Winchester could be used even if the national grid line was not built.

'Preliminary estimates of working at Winchester seem to show about a third of a penny a therm saving in the area,' he said.

Sir Richard Nugent, a member of the committee, was disturbed about the possible tainting of underground water supplies. He pointed out that the Gas Council's consultants had planned their exploratory borings in those areas where porous rocks were known to exist and where the reservoir waters were unlikely to be needed as a source of public supply.

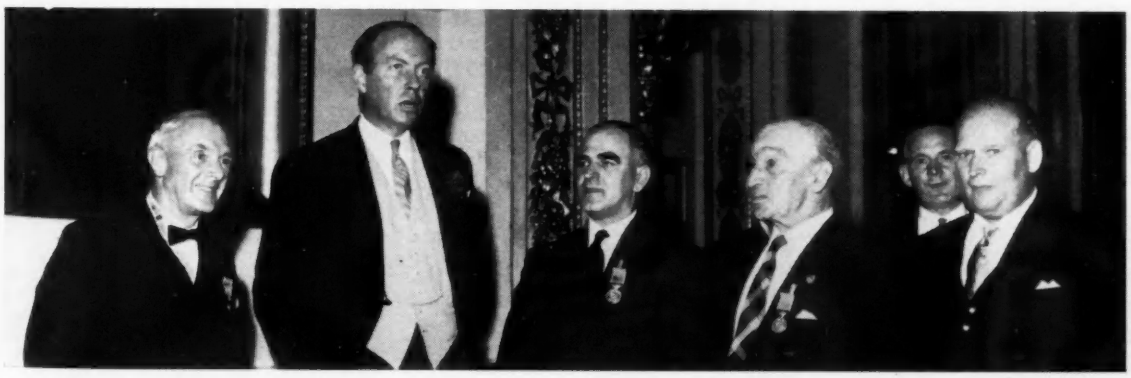
'Do I understand from this that the storage of gas in these underground reservoirs would pollute the water to some extent?' he said.

Sir Henry Jones replied: 'That is true, but natural gas, methane, comes out of the ground and out of waters of this kind and it is a very pure gas. In that case the pollution would be very small indeed.

'Town gas, however, I am bound to say, might affect the water and for that reason one of the attractions of some of these sites is that we believe the water which is in the strata is already brackish and unsuitable for drinking.

'Where it is not of that kind we have to be quite sure that it will not be drawn upon for public supply.

'If we can find, as we believe we can, structures in which the water is non-potable because it is brackish or saline, then I do not foresee any great difficulty.' he said.



The Minister of Power, Mr. Richard Wood, with on his right Mr. W. J. Taylor, a Pressureman, Mersey Group, North Western Gas Board, and on his left Mr. C. Curry, Assistant Engineer and Exhausterman, North Shields gasworks, Northern Gas Board, Mr. V. W. Grundy, First Class Gasfitter, East Midlands Gas Board, Sheffield and Mr. S. W. G. Meddick, Mains and Service Inspector, Sydney Wharf, South Western Gas Board, Bath, after he had presented them with British Empire Medals, on behalf of the Queen, at Lancaster House, London. The medallists and their wives and relatives then visited Murdoch House, where they met and were congratulated by Sir Henry Jones, M.B.E., Chairman of the Gas Council, who presented them with small mementos of the occasion.

FROM REFINERY GAS TO TOWN GAS

Catalytic reforming plant for Australia

AUSTRALIA'S first catalytic reforming plant for the conversion of refinery petroleum gases into standard town gas came on stream on October 13 at the works of the Geelong Gas Company, in Victoria.

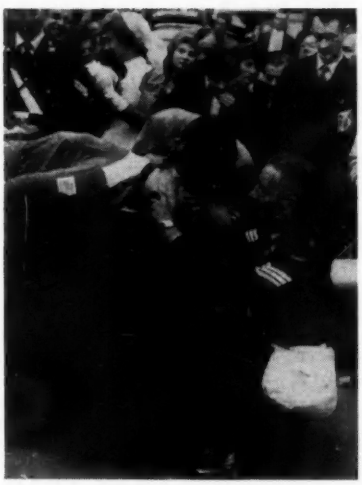
The installation was designed and constructed by the Sydney office of Humphreys & Glasgow Ltd., international contracting engineers, who have built similar plants throughout the world.

The Geelong Gas Company was founded over a century ago. Last year, it produced some 600 mill. cu.ft. of gas. Thus the new Onia-Gegi plant will supply a big proportion of the city's gas supply.

It consists of two catalytic reforming units, each with a capacity of 1.5 mill. cu.ft. per day of town gas. The feed stock will normally be tail gases piped five miles direct from the Shell refinery at Corio.

To cater for refinery maintenance periods the reforming plant will use as an alternative feedstock l.p.g., which will be held in store at a nearby tank farm.

During the reforming process, refinery gases mixed with steam pass through a special nickel-base catalyst at a temperature of approximately 850°C., where the hydrocarbon steam reaction takes place to yield a reformed gas having a calorific value of approximately 350 B.t.u. per cu.ft. This is further enriched with additional refinery gas.



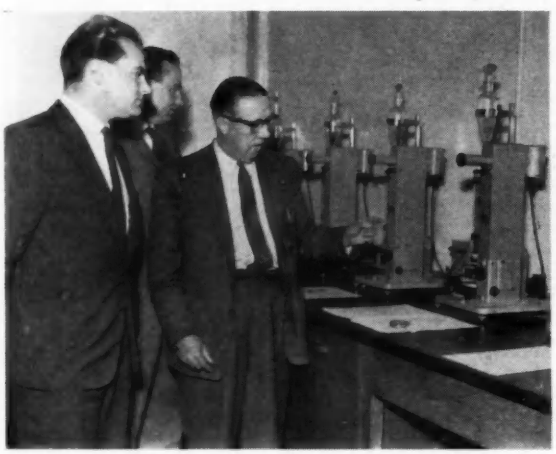
Miss Margaret Currie, Scottish Gas Board, Glasgow, performing the 'kiss of life' mouth-to-mouth method of artificial respiration at a demonstration.

Polyethylene plant for East Germany?

TWO official representatives in the United Kingdom of the Chamber of Foreign Trade of the German Democratic Republic visited the Cheadle Heath, Stockport, headquarters of Simon-Carves Ltd. recently.

They are: Mr. Jost Prescher, Director of K.F.A. Ltd., and Mr. Werner Marcinkowski.

The visitors were particularly interested in the capacity of the company for contracting for the building of a projected complete polyethylene plant at Leuna.



Mr. W. Bostock, Simon-Carves' Research Manager, describing the instrument he devised for the determination of particle size distribution to Mr. Jost Prescher, left, and Mr. Werner Marcinkowski, centre, in a Simon-Carves laboratory. The method is to be adopted as a British Standard for particle size analysis by sedimentation.

NEW HEATING CENTRE FOR LONDON

A PERMANENT exhibition featuring all the latest heating appliances and equipment is scheduled to open this coming winter at 34 Mortimer Street, London, W.1.

Pithers Radiant Stoves and the London Warming Company—two of the oldest firms in the field—have merged their interests in order to establish a centre which will cover every source of heating served by solid fuel—gas, oil and electricity—all under one roof.

Expert advice

This will be of considerable benefit to the public seeking impartial advice on individual heating problems. Advice will be given by experts provided by the centre, as opposed to heating information at present only available from a confusing number of independently sponsored sources.

To implement the Heating Centre's policy of impartiality, an independent panel of experts will be set up for the purpose of selecting for display appliances and equipment which are thought to be the best examples of particular types in a specified price bracket.

Ordering facilities

Consideration is being given to design, construction, performance, economy of running (where applicable) and method of installation.

Equipment can not only be seen, but also ordered immediately if chosen, either through the Centre, local merchants, or approved heating engineers with whom a high-degree of co-operation is anticipated.

Apart from the displays of selected appliances, a comprehensive reference library will be set up for self-selection, with photographs and information covering latest equipment and fuels. Relevant booklets and leaflets will be available on request.

PIPELINE CONVENTION

A TECHNICAL convention will be held in conjunction with the Pipes, Pipelines, Pumps and Valves Exhibition to be held at Earls Court, London, next April.

The convention will last four days and among the subjects it will cover are: The manufacture, construction and maintenance of various types of pipeline; the operation of gas pipelines, including underground storage; instrumentation and automatic control of pipelines, and submarine pipelines.

THE INSTITUTION and Junior Associations

Fuel policy for Wales gas

A DESIRE for the Wales Gas Board to play its part in stabilising the economy of the mining areas of Wales was voiced by Mr. T. Mervyn Jones, Chairman of the Wales Gas Board, when he spoke at a luncheon following the annual general meeting of the Wales and Monmouthshire Section in Cardiff on October 12.

He was, he said, delighted to be in the middle of a scheme for harnessing this valuable fuel, and pointed out that 97.34% of the gas sent out by the Board came from a coal source.

The industry was very old in years, but it was ever new. In Wales they laid claim to the proposition that in Britain the most economical and most efficient way of transmitting energy was in the form of gas through a high pressure pipeline. There had been critics of that argument who had maintained that the gas industry was on the way out. 'How foolish can you be?' asked Mr. Mervyn Jones.

'Race is to the skilful'

Referring to the Section, he said that its purpose was to keep in the forefront the necessity of extending the boundary of knowledge and the furtherance of skill. 'If the race is not to the strong,' he added, paraphrasing the quotation 'the race is to the skilful.'

Mr. Mervyn Jones paid tribute to the retiring chairman of the Section, Mr. S. L. Wright, and the high standard of efficiency he had achieved as Chief Engineer of the Board.

Mr. Mervyn Jones was proposing the toast of the Wales and Monmouthshire Section. A response was made by the new Section Chairman, Mr. Elwyn Jones, who in turn proposed the toast of The Prosperity of the City of Cardiff, to which the Lord Mayor, Alderman E. Ewart Pearce, J.P., responded.

Mayoral welcome

At the 12th annual general meeting which preceded the luncheon, the Lord Mayor welcomed the Section to Cardiff.

Commenting on the Management Committee's report, which was later approved and adopted, the Hon. Secretary, Mr. J. Powdrill, said that for the first time for many years membership showed a net increase of seven members during the year, bringing the total to 134.

It was announced that Mr. Kenneth Mathews, of the Swansea undertaking, had been named as the recipient of the eighth Octavius Thomas memorial prize as the most deserving student of the year. Mr. Mathews had commenced training as a gas fitter at Swansea. In 1960 he had passed the City & Guilds Gas Fitting final examination and in the same year passed the O.N.C. in Mechanical Engineering. He had also been chosen to represent South Wales in the Apprentice of the Year Competition and had received a finalist's silver medal. He commenced at the Royal Technical College, Salford, in 1960, and had successfully completed the first year, securing an A pass in Gas Engineering.

Officers elected for the new session were: *Chairman,* Mr. Elwyn Jones; *Senior Vice-Chairman,* Mr. D. E. West; *Junior Vice-Chairman,* Mr. W. K. Parsons; *Hon. Secretary,* Mr. J. Powdrill; *Hon. Treasurer,* Mr. O. P. Cronshaw; and *Hon. Auditors,* Mr. D. S. Davies and Mr. R. Jones.

Members also approved the appointment of Mr. S. D. Coole (Barry), Mr. G. Fitton (Neath) and Mr. J. Lomax (Bangor) to membership of the Management Committee.

Mr. Wright handed over his badge of office to his successor, Mr. Jones, whose first duty was to present him with a silver salver in token of his successful year of office.

The meeting concluded with a paper on 'Gas Governors' presented by Mr. R. Hutchinson, of the Bryan Donkin Co. Ltd., which was followed by a brief discussion.

THE DESIGN CENTRE IS GOING TO LEEDS

THE Council of Industrial Design is to hold a large-scale exhibition in Leeds next year, under the title 'The Design Centre Comes to Leeds'. Special displays to coincide with the exhibition are being mounted in many retail stores in the city and in gas and electricity showrooms. Other supporting activities will also be arranged.

The exhibition, which will take place from May 3-27, in the Leeds Art Gallery, has as co-sponsors the Leeds Chamber of Commerce and the Leeds Chamber of Trade.

In addition, 45 local manufacturers, retailers and undertakings have generously promised contributions towards the cost of the exhibition.

400 EXAMPLES

Some 400 examples of well-designed products for the home will be displayed. They are being chosen from Design Index, the Council of Industrial Design's record of some 10,000 British goods in current production.

The exhibition is intended to show people in Leeds, who for reasons of geography are not able to visit the Design Centre in London, some of the many interesting modern designs now available on the market.

BRITISH TAR FOR BRITISH ROADS

UNDER the Chairmanship of Mr. J. Hunter-Rioch, Eastern Gas Board Divisional General Manager at Cambridge, surveyors and road engineers have been in conference at Norwich, where they were entertained by the British Road Tar Association.

After luncheon Mr. Hunter-Rioch opened the afternoon meeting. He mentioned the changes which had taken place in the B.R.T.A. since the last conference, and apologised for the absence of Mr. C. E. Carey, the new B.R.T.A. Chairman, and Mr. J. H. Dyde, Chairman of the Eastern Gas Board, who had both been prevented from attending, and went on to welcome Mr. S. A. Stewart, who had been appointed Director of the B.R.T.A. following the retirement of Mr. Davidson Pratt.

Mr. J. H. Nicholas, head of the Bituminous Materials section of the Road Research Laboratory, spoke on the general subject of road construction under the title of 'Progress in bituminous materials'.

He described the research which was in progress at the Road Research Laboratory.

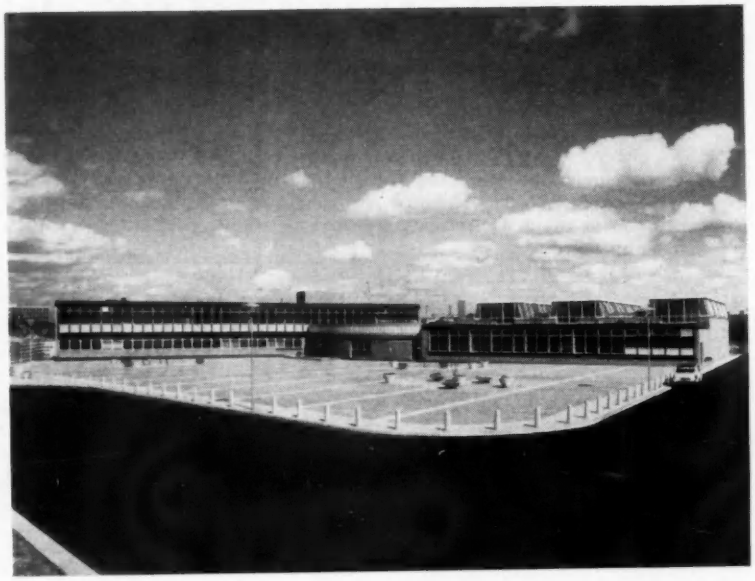
PAKISTAN FORMS OIL AND GAS CORPORATION

A PUBLIC corporation for the exploration and development of oil and gas resources in Pakistan will shortly be established, says the *Financial Times.*

To be called the Oil and Gas Development Corporation, it will be a corporate body under a Board of directors to be appointed by the Central Government.

The Board will act on commercial considerations, having regard to public interests, but will be guided on questions of policy by the Government.

Under the law it has been empowered to carry out oil and gas surveys in both wings of the country; to undertake drilling and other prospecting operations to estimate reserves; to conduct the refining of oil and gas; and to sell, distribute and dispose of oil, gas and refined products.



An impressive view of the exterior of the new South Eastern Gas Board Area Training Centre.

'A FINE NEW ACHIEVEMENT'

South Eastern Board opens area training centre

THE Permanent Secretary to the Ministry of Power, Sir Dennis Proctor, K.C.B., opened the South Eastern Gas Board's new Area Training Centre at Old Kent Road, London, last week. Sir Dennis referred to the recent Select Committee Report, and said that the Committee had nothing to criticise in the gas industry's training and education scheme.

He was proud to be associated with the opening of the training centre—'a fine new achievement.' The Board, he said, had a great record in trading and education, going back to the days of pre-nationalisation.

In particular he singled out Sir Henry Jones, Chairman of the Gas Council, who progressed in the industry with the former Wandsworth Gas Company and the South Metropolitan Gas Company—both now integrated in the South Eastern Gas Board.

He also mentioned the present Deputy Chairman of the Gas Council, Mr. W. K. Hutchison, and the Secretary of the Gas Council, Mr. R. G. Huxtable, who both had previously served with the South Eastern Gas Board since nationalisation.

The industry, he said, had a hard fight ahead. 'Those who believe in it, as I do, know it will come out on top.'

He said that the South Eastern Gas Board showed that they knew the fight was on and intended to meet it in the best possible way with the new training centre, which would benefit the Board and the consumers.

'I wish you the success that this training centre undoubtedly deserves. You have a bright future ahead of you, and in the establishment of the training centre you show that you intend to make use of it in the best possible way.'

Mr. R. N. Bruce, Chairman of the South Eastern Gas Board, said that with the closure of Vauxhall Works' training school it was decided to bring the Board's training to one centre, where people would benefit by the cross-fertilisation of ideas.

'The strength of any organisation depends on the skill of their employees. We are not competing with the education authorities, we are going along parallel with them.'

Mr. Bruce read a telegram from Mr. W. K. Hutchison, Deputy Chairman of the Gas Council, and former Chairman of the South Eastern Gas Board, conveying his best wishes to those concerned with the training centre.

MORE SKILL IS ADVANCED FOR GAS

TRAINING and education for employees in the gas industry is a statutory obligation under the Gas Act, 1948, which requires provision to be made by area boards 'for advancing the skill of persons employed by them'.

The training and education scheme of the South Eastern Gas Board was based on the existing practices of the gas undertakings which formed the Board. It has, of course, kept in step with the times; it is continuously reviewed, developed and extended, says a brochure produced in connection with the opening ceremony.

The Board's policy in training and education is to make full use of the facilities of the education authorities. About 1,000 employees are enrolled annually for courses in technical, commercial and day colleges, including 60 to 70% of all employees under 21 years of age. By this means engineers, chemists and sales staff, clerical and administrative staff and craftsmen are prepared for their examinations.

Common purpose

The Board's own training is directed towards the special skill and knowledge required in work for the gas industry. Before the new area centre was built, this training was carried out in a small central establishment and six centres—four around London and two in Sussex.

It is now concentrated in the new area training centre. This has great advantages; in administration and control, in maintaining the pattern and standards of instruction and in giving greater flexibility for the development of internal training.

Another important advantage—it brings together people from all over the area for a common purpose.

In two blocks

The building is arranged in two blocks, one two-storey and the other single-storey, divided by a link block, which includes the entrance hall, two canteens, kitchen and the main staircase.

In the two-storey block are the administrative offices, staff rooms, lecture and demonstration rooms, model showroom and library.

The single-storey block has three workshops and associated lecture rooms. Features of the building are generous natural lighting and the use of vitreous enamel on much of the facing and roof edging.

Young people entering the Board's service are given short induction courses to

Help them over the transition period from school to a career, to give them an idea of how the Board works and to show them where they fit into the scheme of things. In the case of apprentices, there is special emphasis on safety at work.

Advanced craft courses are arranged for senior apprentice gas fitters in the fourth and fifth years of their apprenticeship, adding to the standard required by the National Classification Scheme.

Initial training is given in salesmanship, together with the essential elementary technical background and knowledge of office methods and procedures, for trainee showroom staff and trainee district representatives.

All sales staff, home service staff, district foremen and qualified gasfitters have a refresher course every four months at which new appliances, new techniques, tools and materials are explained.

There are practical courses to train in standard codes of main and service laying practice.

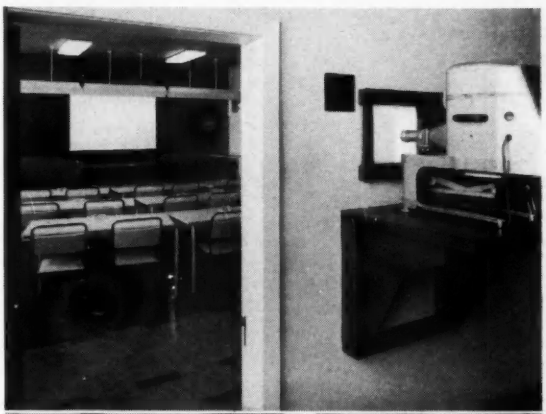
All foremen and supervisors receive the Training Within Industry programme, including the new developments for safety and office supervision.

During each year, this programme provides for something over 4,000 employees to attend the centre with an average of about 100 under instruction at any one time.

In addition, a variety of *ad hoc* courses are undertaken to give instruction in such things as the maintenance of domestic central heating and warmed air systems, specialist selling, and the proper use of the telephone.

The bays in the workshops are used for the examinations in practical gas fitting held annually by the City and Guilds of London Institute.

INSIDE THE CENTRE



A lecture room with adjoining projection unit.

Here is a well-equipped demonstration showroom.

Another practical lay-out in a demonstration room.

RUSSIANS VISIT WHITBY

Five top experts from the Russian gas industry have visited the natural gas station at Whitby in Yorkshire—the only one of its kind in the country.

Natural gas search widens

EXPLORATION work for natural gas—a continuation of what has already been done in the Central Scotland area—is to be undertaken by the British Petroleum Company in three areas.

These are 185 sq. miles in Midlothian and Lanarkshire, 190 sq. miles in West Lothian, and 165 sq. miles in Midlothian and West Lothian.

Planning permission will be sought for the development.

Natural gas has already been found and exploited at Cousland, West Lothian.

EFFICIENCY GROWS FROM NEW WORKSHOP

FOR its size, the small staff employed in the new workshop of the Edinburgh and South-Eastern Division of the Scottish Gas Board performs quite a Herculean task.

Recently the personnel left the premises known as Old Bathgate Works, in Calton Road, for a roomier, more elaborate and better-equipped building in Lower London Road.

Although the size of staff has been reduced, because of improved facilities, output of work has increased. It is here that gas appliances for the entire Edinburgh and South-Eastern Division are overhauled and reconditioned.

In a week, it is not uncommon for the 14-man staff to recondition and repair well over 100 appliances consisting of cookers, wash boilers, water heaters, fires and radiators, and refrigerators.

An important branch of the work relates to reconditioning of material—brass piping, screws, stopcocks—rescued from scrap. This means quite a saving to the Board.

PERSONAL NOTES

MR. D. M. FOULIS, formerly administrative assistant to the commercial manager and latterly acting sales and service manager of the Dorset and Bournemouth Region of the Southern Gas Board, has been appointed Service Manager to the Board. This is a new appointment which makes Mr. Foulis directly responsible to the commercial manager for all aspects of customer service, including the work of installation and customer service departments. Mr. Foulis has spent all his working life in the gas industry, mostly in Liverpool. Since joining the Southern Gas Board in 1957, Mr. Foulis has been identified with the complete re-organisation of customer service in the Board's area.

CAPT. J. J. GOLDSMITH, commodore of the South Eastern Gas Board's collier fleet, has retired after 49 years at sea. He will be succeeded as Commodore by CAPT. H. M. CHASTON, of South Shields, who is at present Master of the 'Ewell.' Capt. Goldsmith gained his master's certificate in sail. He began his career in 1912, his first ship being the full-rigged vessel 'Ben Lees.' In 1925 he joined the South Metropolitan Gas Co. as second officer. He obtained his first command, the 'Effra,' in 1937. He became master of the 'Southwark' in May, 1959, when he was appointed Commodore, and now hands this vessel over to Capt. Chaston.

DR. H. R. LINDEN, research director of the Institute of Gas Technology, U.S.A., has been appointed Director of the Institute. He succeeds DR. M. A. ELLIOTT, who has been named Academic Vice-President of Illinois Institute of Technology, to which I.G.T. is affiliated.

MR. J. W. WARNER has been appointed to the Board of Alkaline Batteries Ltd., manufacturers of Nife and Britannia Batteries, of Union Street, Redditch, Worcs.

COUNCILLOR MRS. M. I. ROBINSON, of Seaham, Co. Durham, has been appointed a member of the Northern Gas Consultative Council.

MR. A. SAMSON, works superintendent at the Stirling gasworks, has retired after 40 years' service in the gas industry.

COUNCILLOR R. RABBITT, of Worksop has been appointed a member of the East Midlands Gas Consultative Council.

MR. G. PATERSON has been appointed Personnel Manager of Head Wrightson & Co. Ltd.

MR. F. S. DAWSON, who was Euk Catering Machinery Ltd. sales manager, has been appointed Home Sales Manager of Moorwood-Vulcan Ltd. MR. W. G. ANSON and MR. E. N. HUGHES, also from Euk, have been appointed Area Sales Managers. This follows Moorwood-Vulcan's recent acquisition of Euk. Mr. Anson will continue to operate in the north. Mr. Hughes takes over the southern area. MR. I. BULLAS, who was already with Moorwood-Vulcan, is the new Midlands Area Manager. Moorwood-Vulcan Ltd. were formed in February by Moorwoods Ltd., of Sheffield, and the Vulcan Hart Corporation of America, acquiring the Euk company in June.

OBITUARY

DR. R. S. ANDREWS, C.M.G., chairman and managing director of the Gas and Fuel Corporation of Victoria has died at his home in Melbourne at the age of 64. He became chief technical officer of the Gas and Fuel Corporation in 1950 after spending 23 years as chief chemist of the Metropolitan Gas Company, Melbourne. He became president of the Australian Gas Institute in 1950 and was created C.M.G. in 1957. He was also a fellow of the Australian Academy of Science.

MR. N. W. HULLAH, station engineer at the Poole works of the Southern Gas Board, has died at the age of 59. He was due to receive an award for 40 years' service in the gas industry. Mr. Hullah's career in the industry started at Poole works in 1920 as an apprentice in the fitting shop. From there he went through all departments of the works and was promoted successively to technical assistant, then in 1939 to works superintendent, and finally to station engineer in April, 1959.

COMING EVENTS

November 2.—EAST MIDLANDS G.C.C.: Nottingham Chamber of Commerce, Smithy Row, Nottingham. 11 a.m.

November 3.—LONDON AND SOUTHERN JUNIORS: Caxton Hall, Westminster. Annual reception and dance. 7.15 p.m.

November 3.—SCOTTISH WESTERN JUNIORS: Industrial Section, 9, George Square, Glasgow. Paper on 'Corrosion,' by J. S. Hogg. 6.30 p.m.

November 7.—THE COMBUSTION ENGINEERING ASSOCIATION, NORTHERN REGION: Sheffield. 'Fuel selection for heating processes in the steel industry.'

November 8.—THE COMBUSTION ENGINEERING ASSOCIATION, SCOTTISH REGION: Glasgow. 'The design and installation of industrial boiler plants.'

TRADE NOTES

PARKINSON COWAN LTD., LONDON, S.W.1. is investigating the possibility of stepping up its exports to Japan. Mr. F. C. Crosse, a Director of Parkinson Cowan International Ltd., has left to make a six-week investigation of markets in the Far East. Mr. Crosse will spend the major part of his time in Japan. He will carry out a market survey for all Parkinson Cowan products covering the gas, liquid and electrical fuels in the industrial and domestic fields. After leaving Japan on October 15 Mr. Crosse will visit Hong Kong and Singapore, before spending two weeks in Australia where he will visit Sydney and Melbourne. He will return to London early in November via New York.

MOORWOOD-VULCAN CO. LTD., held a sales conference recently in London. Determination to build this new Anglo-American catering equipment partnership into a leader in the industry was expressed by Mr. Tom C. Firth, Chairman, and Mr. R. Ivor Slater, Managing Director. Mr. Firth said Moorwood-Vulcan's recent acquisition of Euk Catering Machinery Ltd., was 'not a cold-blooded take-over bid'. The conference was the first comprehensive opportunity for staffs from Moorwood-Vulcan and Euk to get together and study the combined range of products.

KEITH BLACKMAN LTD., London N.17, was visited by delegates to the first international Heating, Ventilating and Air Conditioning Conference. Visitors went 'behind the scenes' to see the methods adopted for the design, development and manufacture of the Tornado range of air moving and treating equipment. Demonstrations were also given dealing with the range of industrial gas burning and control apparatus manufactured by the Company.

THE INCANDESCENT HEAT CO. LTD., Smethwick, is supplying a massive swivel charger track to the Rumanian People's Republic. This track is over 80 ft. long and is a part of the charging machine which will load raw materials into the melting furnaces into a new Rumanian radiator foundry.

THE BRITISH OXYGEN CO. LTD. London, S.W.1., has agreed with the Board of Trade to lease a site near Dumbarton on which to establish progressively a new light engineering factory, while leaving the oxygen plant manufacturing at the existing Edmonton Works.

THE A.P.V. CO. LTD., Crawley, Sussex, and **A.P.V.-PARAMOUNT LTD.** will change their telephone number to Crawley 27777 when Crawley's telephone service becomes automatic at 1 p.m. on October 25.